

SUPPORT FOR THE AMENDMENTS

Support for the amendment of Claim 1 is found on page 28, line 6, in the specification. Applicants note that length as a description of length as number of monomer units is described on page 27, lines 29-32, in the specification.

No new matter is believed added to this application by entry of this amendment.

Claims 1-17 are active.

REMARKS/ARGUMENTS

The claimed invention provides a lubricant composition as described in Claim 1 and claims dependent thereon, for modern gearboxes, engines and hydraulic pumps which contains highly effective friction modifying additives that are stable to oxidation and thermal stress, have increased solubility in nonpolar lubricant oils and improve the flow properties of the lubricant oil.

Applicants respectfully note that Claim 1 is herein amended to include description that a ratio of the length of the hydrophobic segments to the polar segments of the block copolymer is in the range of from 5:1 to 1:2. Length as described in the specification describes the number of monomer units in a segment of the block copolymer.

The rejection of Claims 1-9, 13-14 and 17 under 35 U.S.C. 103(a) over Mishra et al. (U.S. 5,834,408) is respectfully traversed.

Mishra describes an acrylic copolymer obtained by anionic polymerization of the following acrylic monomers:

- a) 0-60% $\text{CH}_2=\text{C}(\text{R})-\text{C}(\text{O})-\text{O}-\text{R}_1$ wherein R_1 is C_{1-5} alkyl;
- b) 0-60% $\text{CH}_2=\text{C}(\text{R})-\text{C}(\text{O})-\text{O}-\text{R}_2$ wherein R_2 is C_{6-14} alkyl; and
- c) 15-80% $\text{CH}_2=\text{C}(\text{R})-\text{C}(\text{O})-\text{O}-\text{R}_3$ wherein R_3 is C_{15-22} alkyl. (Claim 1)

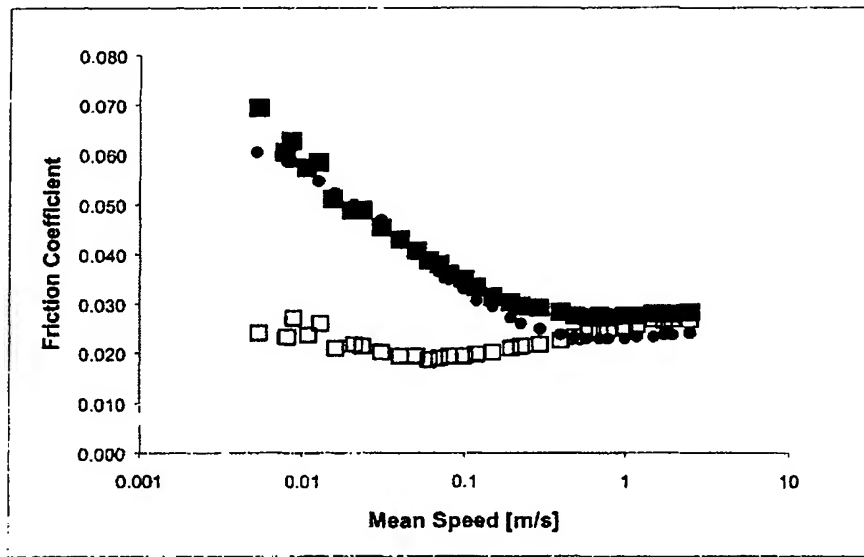
At least one of a) and b) is present and the total amount of a) and b) is from 20-85 weight per cent. Mishra requires a polydispersity index of from 1 to 1.5.

Other monomers may be added to the polymerization, including dialkylaminoalkylacrylamides (Col. 3, lines 20-39). The Office has pointed to Col. 3, lines 27-39 of the reference as reading on formula III (Official Action dated May 13, 2009, page 5, lines 1-2, repeated in Official Action dated November 6, 2009, page 3, paragraph 5).

However, nowhere does Mishra disclose or suggest any numerical segment length relationship of the dialkylaminoalkylacrylamide segment relative to a hydrophobic segment of the copolymer and nowhere does this reference provide any guidance regarding this relationship.

In addition, Applicants respectfully submit that nowhere does Mishra disclose or suggest that a **block copolymer** as according to the claimed invention wherein a ratio of the length of the hydrophobic segments to the polar segments of the block copolymer is in the range of from 5:1 to 1:2 would provide the significant and unexpectedly reduced Friction Coefficient values at low mean speed shown in Figures 2-5 of the specification. Figure 2 shows the Friction Coefficient of a block copolymer of a hydrophobic segment comprising methyl methacrylate and a mixture of long chain (C₁₂ to C₁₅) methacrylates and a polar segment of N-(3-Dimethylaminopropyl)methacrylamide compared to a random copolymer of the same monomer composition. Figure 2 is again reproduced below for the Examiner's convenience.

Figure 2:



Frictional values of Example 5 (□), Comparative Example 5 (■) and Comparative Example 11 (●)

Applicants state:

“Figure 2 shows that the lubricant which comprises the VI improver according to Example 1 has a distinctly reduced frictional value from a speed of 0.4 m/s. The frictional profile of the Stribeck curve is shifted to lower speeds to such an extent that, within the measuring capabilities of the mini traction machine down to 0.0056 m/s, no significant rise in the coefficient of friction can be observed. In the speed range between 0.4 and 0.04 m/s, a slight lowering in the coefficient of friction with falling speed is even achieved.” (Page 49, lines 19-29)

Applicants respectfully submit that Mishra does not disclose, suggest or provide motivation that would have led one of ordinary skill in the art at the time of the invention to expect the significant reduction in friction at low speed range obtained with the specific composition according to the claimed invention. Nowhere does this reference discuss or infer that a block copolymer wherein a ratio of the length of the hydrophobic segments to the polar segments of the block copolymer is in the range of from 5:1 to 1:2 would provide the performance obtained with the claimed invention. In fact, Mishra states (Col. 4, lines 37-40):

The comonomers are preferably added in one-shot (at-once) as a single amount or rapidly added as a single stream.

Applicants submit that nowhere does Mishra disclose or suggest that significant improvement in frictional value at low speeds could be obtained by employing the block copolymer composition according to the claimed invention. In contrast, Applicants have shown significant improvement in friction reduction at low speeds due to use of a block copolymer according to the present invention in the examples in the specification.

In discussion of “**Examination Guidelines for Determining Obviousness Under 35 U.S.C. 103 in View of the Supreme Court Decision in *KSR International Co. v. Teleflex Inc.***” the Office has stated:

“The rationale to support a conclusion that the claim would have been obvious is that **all the claimed elements were known in the prior art** and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded nothing more than predictable results to one of ordinary skill in the art at the time of the invention. “[I]t can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does.” **If any of these findings cannot be made, then this rationale cannot be used to support a conclusion that the claim would have been obvious to one of ordinary skill in the art,**” (Federal Register, Vol. 72, No. 195, page 57529) (Bold added) (Citations omitted)

Applicants submit that the cited reference does not disclose or suggest all the presently claimed elements and therefore, according to the above KSR guidelines, a conclusion of obviousness cannot be supported.

In view of all the above, Applicants submit that Mishra cannot render the claimed invention obvious and withdrawal of the rejection of Claims 1-9, 13-14 and 17 under 35 U.S.C. 103(a) over Mishra is respectfully requested.

The rejection of Claims 10-12 under 35 U.S.C. 103(a) over Mishra in view of Pappas et al. (U.S. 3,816,314) is respectfully traversed.

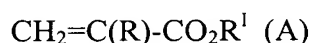
Claims 10-12 all depend directly or indirectly from Claim 1 and therefore include the description of the independent claim. The deficiencies of Mishra with respect to Claim 1 have been described above.

The Office has acknowledged that (Official Action dated May 13, 2009, page 6, lines 2-5, repeated in Official Action dated November 6, 2009, page 3, paragraph 6):

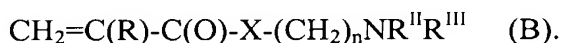
Mishra does not, however, disclose a concentration range for the monomers with polar segments and therefore Mishra does not disclose a weight ratio between the two segments. Mishra also does not explicitly disclose weight average degree of polymerization of the hydrophobic or polar segments.

Pappas is cited to show a weight ratio of polar and nonpolar segments.

Pappas describes an oil additive which is an oil soluble block copolymer of a comonomer A of the formula:



and comonomer B of the formula:



R^{I} in formula (A) is a C_8 to C_{22} substantially straight chain alkyl group. Pappas describes (Col. 5, lines 15-20):

The block polymers of the present invention comprise from about 99.75 to about 90 mole percent of the first comonomer A units and from about 0.25 to about 10 mole percent of the second comonomer B units. Preferably the molar ratio of the first comonomer A to the second comonomer B lies between 99:1 to 95:5.

Applicants submit that the Pappas comonomer (A) is a hydrophobic monomer and comonomer B is hydrophilic. Further, Applicants submit that the claimed invention describes a ratio of the length of the hydrophobic segments to the polar segments of the block copolymer is in the range of from 5:1 to 1:2 and that because length herein means number of monomer units, the claimed ratio range can be directly converted to equivalent mole percent values of 83 (5/1) to 33 (1/2) % hydrophobic segment. Comparison of these values to those

described by Pappas shows that the cited secondary reference does not disclose or suggest the block copolymer of the presently claimed lubricant composition.

In view of the above, Applicants respectfully submit that the cited reference cannot cure the deficiency of Mishra previously described and therefore the cited combination of references cannot render the claimed invention obvious. Accordingly, withdrawal of the rejection of Claims 10-12 under 35 U.S.C. 103(a) over Mishra in view of Pappas is respectfully requested.

The rejections of Claims 15 and 16 under 35 U.S.C. 103(a) over Mishra in view of Nesvadba et al. (U.S. 2004/0242813) and Benicewicz et al. (U.S. 2003/0060577) respectively, are respectfully traversed.

Applicants respectfully note that Claims 15 and 16 depend from Claim 1. The deficiency of the primary reference was described above.

Nesvadba is cited to show an initiator with a transferable atom group.

Nesvadba describes a process for the preparation of hydroxyl-vinyl-aromatic polymers by anionic radical polymerization (Abstract). Nowhere does this reference disclose or suggest a block copolymer according to Claim 1 and therefore, Nesvadba cannot cure the deficiency of the primary reference.

Benicewicz is cited to show a dithiocarboxylic ester.

Benicewicz describes a process for preparing dithiocarboxylic esters. This secondary reference is not directed to the preparation of block copolymers according to Claim 1 of the present invention and therefore cannot cure the deficiencies of the primary reference.

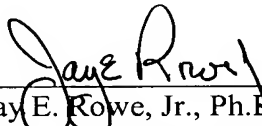
In view of the above, Applicants submit that the cited combinations of references cannot render the claimed invention according to Claims 15 and/or 16 obvious and withdrawal of the rejections of Claims 15 and 16 under 35 U.S.C. 103(a) over Mishra in view of Nesvadba and Benicewicz respectively, are respectfully requested.

Application No. 10/550,764
Reply to Office Action of November 6, 2009

Applicants respectfully submit that the above-identified application is now in
condition for allowance and early notice of such action is earnestly solicited.

Respectfully submitted,

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